

**East Branch Stony Run (Lake County)
Impaired Water Quality
Source Identification Study**

October 2000



**Surveys Section
Assessment Branch
Office of Water Quality
Indiana Department of Environmental Management
Indianapolis, Indiana
IDEM 032/02/070/2003**

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Source Identification Study**

By

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Compilation and development of the final report was the primary responsibility of the Surveys Section
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September 2003**

Acknowledgements:

Tim Beckman, Jim Butler, Art Garceau, and Sam Gibson of the Office of Water Quality, Assessment Branch for equipment preparation and field activities assistance. Stacey Sobat provided information and peer review for biological findings and statements in this report. Tim Bowren for providing QA/QC reports of all data. Cindy Martin created and provided the site map for the East Branch Stony Run watershed, and finally, Chuck Bell conducted editing activities to polish and finalize this report.

Cover Photo – Site UMK130-0015, East Branch Stony Run facing North, upstream from 145th Avenue Bridge.

McFall JL. 2003. *East Branch Stony Run (Lake County) Impaired Water Quality Source Identification Study*. Indiana Department of Environmental Management, Office of Water Quality, Assessment Branch, Surveys Section, Indianapolis, Indiana. IDEM 032/02/070/2003.

Abstract

East Branch Stony Run is a small stream in east central Lake County that originates at the Lake Holiday dam outlet and flows south to a confluence with Stony Run and Middle Branch Stony Run at a point west of Hebron, Indiana. A sampling site was located on East Branch Stony Run for the 1999 Probabilistic Survey. Sampling results from the study indicated East Branch Stony Run was impaired due to ammonia, chlorides, and dissolved solids. A very marginal fish community structure was present and poor habitat was observed. A follow-up Source ID study was conducted during October of 2000 to determine the extent of contamination and to identify sources causing the impaired conditions. Findings from this study indicated that the Twin Lakes Utilities STP and the Winfield Elementary STP were having operational problems during the summers of 1999 and 2000 which resulted in poor quality effluent discharges, permit violations, and promoted prolific downstream algae growth. Ammonia removal in particular was very problematic for Twin Lakes Utilities. During summer low flow conditions, the Twin Lakes STP effluent makes up 100% of the headwater stream flow due to the lack of water release from the dam at Lake Holiday. Physical influences such as row crop farming, dredging within the past few years, and channelization were additional concerns that existed in the lower reaches of East Branch Stony Run.

Table of Contents

| | |
|---|-----------|
| INTRODUCTION..... | 1 |
| 1999 Watershed Survey | 1 |
| 2000 Source ID..... | 3 |
| MATERIALS AND METHODS | 3 |
| Sample Locations | 3 |
| Chemical Measurements | 4 |
| Physical Characteristics and Measurements | 5 |
| Quality Assurance..... | 5 |
| RESULTS AND DISCUSSION..... | 5 |
| General Observations | 5 |
| Algal Growth..... | 6 |
| Flow Measurement..... | 6 |
| Water Chemistry | 7 |
| NPDES Dischargers..... | 7 |
| Quality Assurance/Quality Control Results..... | 8 |
| <i>Data Quality</i> | 8 |
| <i>Precision</i> | 8 |
| <i>Accuracy</i> | 8 |
| <i>Holding Times</i> | 8 |
| <i>Blanks</i> | 8 |
| SUMMARY AND CONCLUSIONS | 12 |
| REFERENCES | 14 |

List of Tables

| | |
|---|----|
| TABLE 1 SITE LOCATION DESCRIPTIONS..... | 4 |
| TABLE 2 FIELD PARAMETERS COLLECTED | 4 |
| TABLE 3 CHEMICAL PARAMETERS FOR LABORATORY ANALYSIS..... | 5 |
| TABLE 4 STREAM FLOW | 7 |
| TABLE 5 GENERAL CHEMISTRY LABORATORY RESULTS FROM COMPOSITE SAMPLES..... | 10 |
| TABLE 6 NUTRIENTS LABORATORY RESULTS FROM COMPOSITE SAMPLES..... | 10 |
| TABLE 7 FIELD SAMPLING RESULTS..... | 11 |
| TABLE 8 IDENTIFIED CAUSES FOR 305(B) REPORT AND 303(D) IMPAIRMENT LISTINGS..... | 12 |
| TABLE 9 IDENTIFIED SOURCES FOR 305(B) REPORT AND 303(D) IMPAIRMENT LISTING..... | 13 |

List of Figures

| | |
|-----------------------------------|---|
| FIGURE 1 MAP OF SAMPLE AREA | 2 |
|-----------------------------------|---|

Attachments

Attachment I Fish Community Assessment

Attachment II Quality Assurance of Analytical Data for Water Samples from IDEM Sample Set # 00WQW231

Attachment III Quality Assurance of Analytical Data for Water Samples from IDEM Sample Set # 00WQW232

Introduction

East Branch Stony Run drains a small watershed situated in east central Lake County near the small town of Leroy, Indiana. The headwater begins at the Lake Holiday dam outlet and flows in generally a southern direction to a confluence with Middle Branch Stony Run and Stony Run approximately two miles west of Hebron, Indiana. Other than precipitation, headwater flow is entirely dependent upon water release from Lake Holiday and discharge from the Twin Lakes Utilities Sewage Treatment Plant (STP) which serves Lakes of the Four Seasons lakeside communities surrounding Big Bass Lake and Lake Holiday. Land usage in the watershed is primarily lakes and lake communities in the northern quarter of the watershed and predominately agricultural row crops in the other three-quarters. Two small unincorporated towns Palmer and Leroy, with populations of 120 and 200 respectively (Rand McNally 2002), are situated within the watershed (Figure 1). Winfield Elementary School, which has a National Pollutant Discharge Elimination System (NPDES) permit, is located approximately one-half way down the course of the watershed and discharges to East Branch Stony Run. One other significant feature is the Stony Run County Park located in the southern half of the watershed.

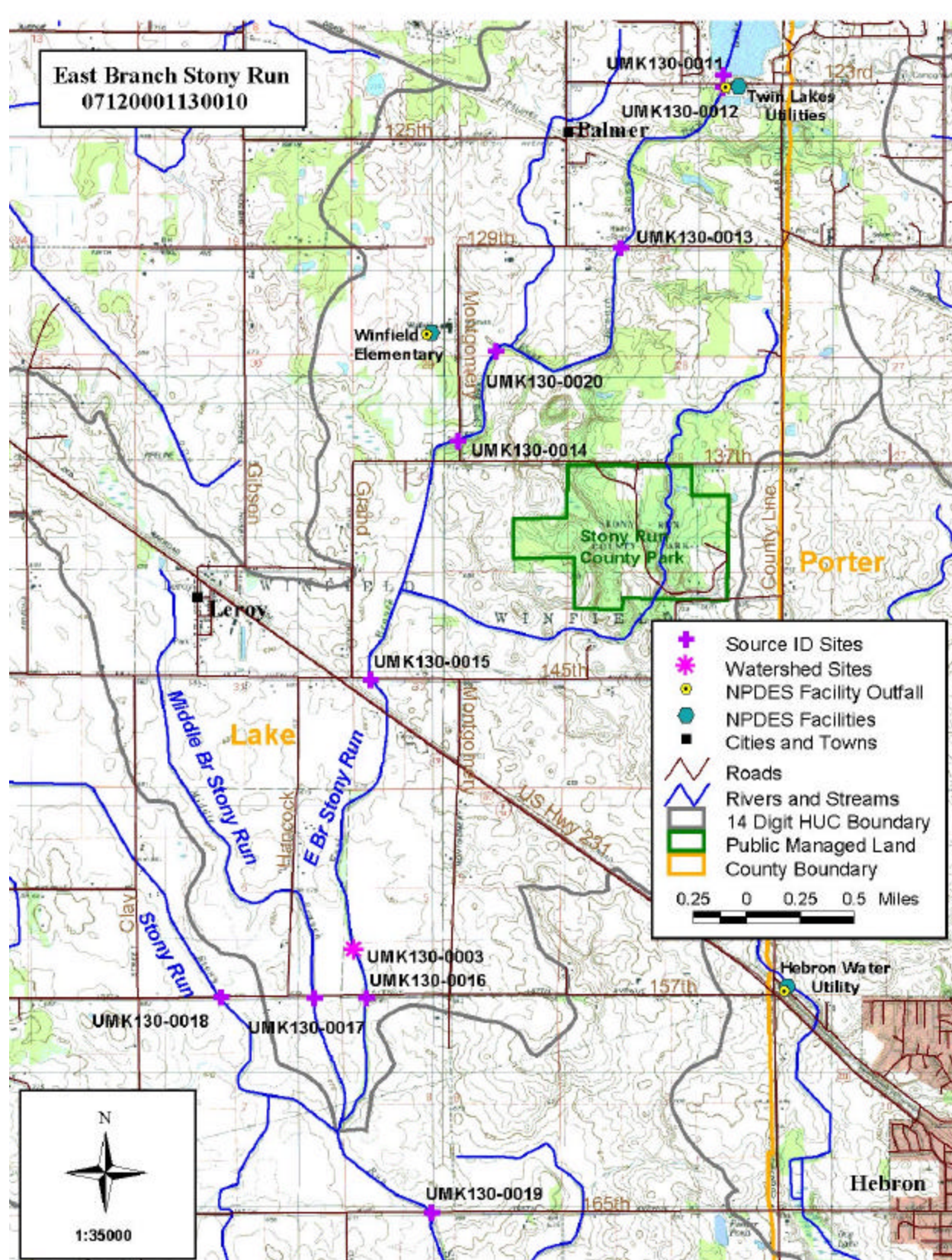
1999 Watershed Survey

East Branch Stony Run was sampled as part of the Assessment Branch probabilistic monitoring program during the field season of 1999 (IDEM 1998a, 1998b, Christensen 2001). A randomly selected site (UMK130-0003) was located at the lower end of East Branch Stony Run just north of 157th Avenue. This site was sampled three times during the field season on May 26th, July 13th, and September 15th, 1999. Laboratory analyses indicated violations of the Indiana Stream Standard (327 IAC 2-1-6) occurred for chlorides, dissolved solids and ammonia during these sampling events. Chlorides were detected in excess of the 230 mg/L stream standard at 280 mg/L and 370 mg/L on July 13th and September 15th respectively. A calculated chronic ammonia standard based on a pH of 8.0 SU and a temperature of 10.98 °C was found to be 2.43 mg/L for September 15th. The analyzed ammonia level for this sampling date was 4.3 mg/L which exceeded the stream standard by 77%. Dissolved solids were found to exceed the stream standard of 750 mg/L for all three sampling events. Detected levels were 850 mg/L, 1000 mg/L, and 1100 mg/L respectively for the sampling events.

These unacceptable levels are indicative of improperly treated effluent that can often be observed downstream of sewage treatment plant (STP) discharges. Ammonia in particular is very toxic to aquatic life and can be found at toxic levels due to inadequate sewage treatment. A primary source of elevated chlorides in domestic wastewater effluents is due to dietary sodium chloride (NaCl) (Csuros 1994). Dissolved solids can also be observed at elevated levels in wastewater effluents and can indicate the presence of other toxic compounds.

The biological data collected at this site in 1999 showed an Index of Biotic Integrity (IBI) score of 32 (maximum score for IBI equals 60) which is considered to be barely supportive of the aquatic life use support (ALUS) criterion (IDEM 2002a). IBI values less than 32 are considered non-supportive for aquatic life use. There was a high percentage of pioneer individuals (88.6%) observed at this location. Pioneer species dominate unstable environments affected by anthropogenic stresses and are the first to re-colonize sections of headwater streams after desiccation (Simon 1991).

Figure 1 Map of Sample Area



Additionally, there were low numbers of individuals (70), few insectivores (11.4%), and no darter/madtom/sculpin species which require high dissolved oxygen, are intolerant to toxicants and siltation, and thrive over clean substrates (Simon 1991). Few headwater individuals (1.4%) indicate an absence of permanent habitat with low environmental stress (Simon 1991). See Attachment I for a complete listing of the Fish Community Assessment. The probabilistic site scored a 49 out of a maximum score of 100 for the Qualitative Habitat Evaluation Index (QHEI), indicating poor habitat due to moderate siltation and bank erosion from recent canopy removal and snagging.

2000 Source ID

The chemical and biological findings from the 1999 random sampling program made East Branch Stony Run a good candidate for a Source Identification (Source ID) study in the following year. Planning for this study needed to take into account all the various impacts such as the Lake Holiday stream impoundment in the headwater, the NPDES discharges, stream physical characteristics, as well as land use in general. Timing of the study during late summer low flow conditions was also a critical factor for this study.

The two NPDES discharges in particular have the potential to impact this headwater stream especially during low flow conditions. The Twin Lakes Utilities STP is a Class II, major semi-public facility with a design flow of 1.10 MGD and contact stabilization. It is served by 100% separate sanitary sewers with no overflow or bypass points identified. The Winfield Elementary School operates a Class I, minor semi-public STP with a design flow of 0.01 MGD and extended aeration.

Materials and Methods

The East Branch Stony Run Source ID study was conducted on October 10th and 11th of 2000. Weather conditions were clear and sunny with ambient daytime air temperatures ranging from 61 to 75 degrees Fahrenheit and nighttime temperatures dipping below 45 degrees Fahrenheit. Water conditions were relatively stable with no precipitation events occurring in the immediate days prior to the sampling event. The study stream reach extended from the Lake Holiday dam outlet (UMK130-0011) to the last sampling point on Stony Run at 165th Avenue (UMK130-0019) for a total stream length of 6.63 miles on East Branch Stony Run and continuing on in Stony Run after their confluence. Total drainage area of East Branch Stony Run above the confluence with Stony Run is 15.9 mi² (Hoggat 1975).

Sample Locations

A total of ten, targeted sampling locations were chosen for this study and are shown in Figure 1. Six stream sites are situated along the 6.63 mile continuous study reach beginning at the Lake Holiday dam outlet and bracketing the NPDES discharges and random site sampled in 1999. Sites were situated on Stony Run and Middle Fork Stony Run upstream of the East Fork Stony Run confluence and were included to provide comparison of water quality levels to the primary study reach. The remaining two sites were necessary to show effluent quality and loadings from the Twin Lakes Utilities and Winfield Elementary NPDES discharges. A complete site listing in upstream to downstream order including detailed descriptions of sampling locations are shown in Table 1.

Table 1 Site Location Descriptions

| Site ID | Stream | Location | Latitude/Longitude |
|-------------|--------------------------|--------------------------|-------------------------|
| UMK130-0011 | Lake of the Four Seasons | Lake Outlet | 41° 23' 43"/87° 13' 30" |
| UMK130-0012 | Twin Utilities STP | 001 Outfall | 41° 23' 40"/87° 13' 30" |
| UMK130-0013 | East Branch Stony Run | 129 th Avenue | 41° 23' 01"/87° 14' 03" |
| UMK130-0020 | Winfield Elementary STP | 001 Outfall | 41° 22' 36"/87° 14' 43" |
| UMK130-0014 | East Branch Stony Run | Montgomery Rd. | 41° 22' 14"/87° 14' 55" |
| UMK130-0015 | East Branch Stony Run | 145 th Avenue | 41° 21' 16"/87° 15' 23" |
| UMK130-0016 | East Branch Stony Run | 157 th Avenue | 41° 19' 59"/87° 15' 24" |
| UMK130-0017 | Middle Branch Stony Run | 157 th Avenue | 41° 19' 59"/87° 15' 41" |
| UMK130-0018 | Stony Run | 157 th Avenue | 41° 19' 59"/87° 16' 11" |
| UMK130-0019 | Stony Run | 165 th Avenue | 41° 19' 07"/87° 15' 03" |

Chemical Measurements

Type of samples collected and selection of proper parameters for analysis were also critical to accurately characterize the water chemistry in East Fork Stony Run. Water chemistry and field data from stream sites were collected four times during a twenty-four hour sampling period from October 11th to October 12th. These four collection times were organized as sampling routes from upstream to downstream and occurred early morning, midday, and late afternoon on the 11th and very early morning on the 12th. This data collection frequency and times facilitated observations over the 24-hour period for possible dissolved oxygen diurnal fluctuations due to excessive algal growth as well as any potentially depressed dissolved oxygen values from poorly treated effluents. The field data was collected by means of a Hydrolab multi-parameter sampling device (Hydrolab Corporation 1991). Aliquots equal to one-fourth of the total sample volume needed were collected and added to the composite sample during each sampling round.

The Twin Lakes Utilities STP and Winfield Elementary School STP facilities were also sampled as components of this study. An ISCO automatic sampler was utilized at the Twin Lakes Utilities STP to collect an aliquot every two hours. These aliquots were then combined into a composite sample at the end of the twenty-four hour sampling period. Field data were collected three times from the outfall effluent during the sampling period. The Winfield Elementary School STP was manually sampled as a three-part composite during the sampling period. Water chemistry aliquots were collected in one-third proportions and field data observations were made on each of the three sampling occasions. It was important that this study be conducted while school was in session in order to evaluate the treatment plant efficiency under loaded conditions. Field and laboratory parameters included in this study are presented in Tables 2 and 3.

Table 2 Field Parameters Collected

| Parameter | Method | Limits of Quantitation |
|----------------------|------------|------------------------|
| Dissolved Oxygen | SM 4500-OG | 0.03 mg/L |
| Turbidity | SM 2130 | 0.3 NTU |
| Specific Conductance | SM 2510 | 3 umhos/cm |
| Temperature | SM 2550 | -5° Celsius |
| pH | SM 4500-H | +/-0.01 SU |

Table 3 Chemical Parameters for Laboratory Analysis

| Anions/Physical | | | Nutrients/Organic | | |
|-------------------|--------|----------|-------------------|--------|----------|
| Parameter | Method | CRQL* | Parameter | Method | CRQL |
| Alkalinity | 310.1 | 10 mg/L | TKN | 351.2 | .05 mg/L |
| CBOD ₅ | 405.1 | 2.0 mg/L | Ammonia-N | 350.1 | .01 mg/L |
| Total Solids | 160.3 | 1.0 mg/L | Nitrate+Nitrite-N | 353.2 | .01 mg/L |
| Suspended Solids | 160.2 | 4.0 mg/L | Total Phosphorus | 356.2 | 1.0 mg/L |
| Dissolved Solids | 160.1 | 1.0 mg/L | TOC | 415.1 | 1.0 mg/L |
| Sulfate | 375.2 | 1.0 mg/L | COD | 410.4 | 3.0 mg/L |
| Chloride | 325.2 | 1.0 mg/L | | | |
| Hardness | 130.1 | 1.0 mg/L | | | |

*CRQL = Contract Required Quantification Limit

Physical Characteristics and Measurements

Physical stream measurements were also an important component in evaluating stream conditions in East Branch Stony Run. Flow measurements were conducted at stream sampling locations by means of a Marsh/McBirney velocity meter (IDEM 2002b). Facility effluent flows were obtained from the facility flow meters. Streambed gradient calculations, in addition to physical stream descriptions, were collected to further evaluate the impaired conditions in East Branch Stony Run.

Quality Assurance

Contracting laboratories provide analytical reports to IDEM that contain test results and Quality Control information for each batch of samples submitted. Quality Assurance and Quality Control (QA/QC) procedures for this study adhered to the Quality Assurance Project Plan (QAPP) and all field and laboratory data collected for this study met QA/QC requirements for Indiana Surface Water Quality Monitoring Programs of the Assessment Branch (IDEM 1999). See Appendix II and III for complete copies of the reports pertaining to this study. Generally, the QAPP requires one duplicate and one matrix spike/matrix spike duplicate (MS/MSD) for every ten samples collected in addition to one blank sample for every field trip. Stream samples and field data are also required to meet Data Quality Assessment Levels cited in the QAPP for Indiana Surface Water Quality Programs. Data Quality Assessment Levels are described in Attachments II and III.

Sampling was conducted according to Standard Operating Procedures (IDEM 2002c).

Results and Discussion

General Observations

East Branch Stony Run is a headwater ditch originating at the Lake Holiday dam outlet which has various influences and characteristics throughout its course. During the study period, the stream was observed to have very low sinuosity of the channel for all sites downstream of the dam. In addition, the stream had been channelized from Site UMK130-0016 downstream to the last sampling site UMK130-0019. A local farmer related that the stream near UMK130-0016 had been dredged two to three years prior to the 2000 study. The outer riparian zone in the upper reaches of the watershed was devoted to numerous uses. These uses varied from the Twin Lakes STP facility grounds near the lake outlet to forest, a radio tower grounds, pastureland (no direct

access observed), residential areas, Winfield Elementary School, and Stony Run County Park. In most cases the inner riparian zone along the stream bank consisted of a thin line of forest ranging from 10 to 20 meters wide. From site UMK130-0015 at 145th Avenue downstream, the land use became much more consistent, with agricultural row crops being prevalent in the outer riparian zone and heavy growth of tall grass and weeds along the stream banks. The water appeared turbid and murky at sampling sites downstream of the dam outlet to UMK130-0016 where the water became slightly greenish but otherwise was clear. Site UMK130-0014 in particular was very turbid and appeared to have a grayish cast. This site was located 2.5 miles downstream of the Twin Lakes Utilities STP outfall and .45 miles downstream of the Winfield Elementary STP outfall.

Observation of the East Branch Stony Run study reach during the 2000 survey revealed no visible evidence of aquatic life at any of the sampling locations. In contrast, schools of minnows were observed in the clear water of Stony Run at sampling site UMK130-0018 which is situated upstream of the confluence with East Branch Stony Run. Schools of minnows, crayfish, etc. are usually readily apparent in a healthy stream ecosystem. Stony Run at UMK130-0018 had very similar physical characteristics and habitat as that of the lower reaches of East Branch Stony Run i.e. channelization, row crop activity, etc. The one main difference in these two similar sized streams was that East Branch Stony Run was heavily influenced by the two upstream point source discharges.

Algal Growth

Prolific algae growth was observed at sampling sites UMK130-0015 and UMK130-0016 during the Source ID study. Large clumps of algae that had accumulated along the edge of the channel and large strands of algae waving in the current were observed at both locations. Although algae was also observed upstream and downstream of these locations, the growth appeared more as a light coating on the streambed. The UMK130-0015 sampling site was located 3.7 miles and 1.65 miles downstream of the Twin Lakes Utilities STP and the Winfield Elementary STP outfalls respectively. Site UMK130-0016 was located 5.3 miles and 3.25 miles downstream of these facilities respectively. Site UMK130-0014 is more closely situated downstream of the two facilities and did not show visible evidence of algae growth. The very turbid and murky conditions of the water combined with the shady conditions at this site were inhibiting photosynthetic activity. These findings again contrasted with site UMK130-0018 on Stony Run where there were no overt signs of algae in the clear water conditions.

Flow Measurement

Evaluation of flow data during the sampling period indicated there was no water release from the Lake Holiday dam. This means that the total headwater flow was comprised of the Twin Lakes Utilities STP 001 effluent discharge. Some effluent flow was actually ebbing upstream to the dam outlet pool so that a single grab sample taken at this location was a relatively stationary effluent sample. Instream flow measurement at the first downstream site (UMK130-0013 at 129th Avenue) of Twin Lakes Utilities STP showed a flow of 1.26 cfs or .814 MGD. The Winfield Elementary STP discharge during the survey was only 2,970 gallons or a 274:1 dilution ratio of stream flow to effluent. Stream flows measured during this study are presented in Table 4. Average gradient was 8.28 ft/mi and was not a factor in inhibiting stream flow and reaeration for the study stream reach.

Table 4 Stream Flow

| Site | Flow cfs | Site | Flow cfs |
|-------------|----------|-------------|----------|
| UMK130-0013 | 1.26 | UMK130-0017 | .32 |
| UMK130-0014 | 1.01 | UMK130-0018 | .92 |
| UMK130-0015 | 1.27 | UMK130-0019 | 4.41 |
| UMK130-0016 | 2.3 | | |

Water Chemistry

Water chemistry results from the composite samples and field data collected did not show serious water quality conditions in East Branch Stony Run during the twenty-four hour sampling period (Tables 5, 6, and 7). Nutrient blank contamination effected the integrity of the analysis for COD, TKN, and Ammonia for all sampling sites. Values listed for those parameters in Tables 5 and 6 represent less than five times the blank contamination (Attachments II and III). Fortunately, the loss of this data did not prove critical to the conclusions presented later in this report. The data shows that CBOD levels were not elevated, and there was not an oxygen sag or diurnal oxygen flux as was expected because of the presence of heavy algae growth at sites UMK130-0015 and UMK130-0016. Additionally, the algae growth did not increase pH values at these sampling locations.

The chemistry data, however, did show stream standard violations for chlorides, total dissolved solids and nitrate+nitrite at numerous locations. The levels observed for these parameters, while not having the toxic impact of ammonia for instance, are useful in showing potential stream reach impact from the STP effluents. Although serious water chemistry stream degradation was not found during the survey period, stream conditions (i.e. lack of aquatic life and heavy algae growth) indicated adverse impacts sometime prior to the sampling event.

NPDES Dischargers

Review of both facilities Monthly Report of Operations (MROs) and Discharge Monitoring Reports (DMRs) proved extremely useful in evaluating effluent impacts prior to the Source ID study. Twin Lakes Utilities had reported numerous operational problems at the STP from July through October of 1999. Among the most critical reported problems effecting treatment plant efficiency were power outages, illegal dumping in the sewer system, and blower operational problems that inhibited ammonia removal. During this period, Twin Lakes Utilities STP reported ammonia violations during the months of July, September and October. The week of September 13th through the 17th showed severely elevated ammonia levels for a weekly average. Facility effluent violated both loading (35.4 lbs/day) and concentration (8.06 mg/L) during this week. Summertime, weekly average ammonia limitations for this facility were 18.4 lbs/day and 2.0 mg/L. The third probabilistic collection event during 1999 for site UMK130-0003, located 5.1 miles downstream of Twin Lakes 001 outfall, coincidentally occurred on September 15th and indicated a stream standard exceedance of 2.43 mg/L based on a temperature of 10.98 C^o and a pH of 8.0 SU. Other weeks showing permit exceedances of the ammonia limits occurred July 5th through the 9th, September 6th through the 10th, and the 27th through the 30th, October 11th through the 15th, 18th through the 22nd, and 25th through the 29th. Operational problems again occurred in the summer of 2000 when permit weekly average exceedances for ammonia occurred during the weeks of May 21st through the 25th, June 4th through the 8th, and July 4th through the

8th. There were also numerous permit exceedances for E. coli reported in the summer months of 1999 and 2000.

Review of the Winfield Elementary School STP MROs and DMRs revealed the operator in responsible charge had resigned his position at the end of June in 1999. This resulted in a three-month period (July, August, and September) when no analyses were conducted or records of treatment plant operations were kept or submitted to IDEM. This may have been a moot point in terms of effluent quality for July and most of August since school was not in session. Effluent quality for the end of August and September in all likelihood was problematic due to lack of operational oversight. Beginning in October of 1999 the MRO comments reported “major repairs, breakdowns, process upsets and their causes, etc. in-plant treatment process bypass”. These same comments were recorded verbatim in the spring and fall of 2000 on the MROs.

Additionally, comments on the September 2000 MRO indicated “reaeration blower coupler broke at end of August. Resulted in some lower D.O.s. Blower coupler repaired.” Average dissolved oxygen for the month of August was 2.78 mg/L although average flow was only 173.6 gallons a day. This facility also encountered a few suspended solids and chlorine permit violations in the summer of 2000.

Quality Assurance/Quality Control Results

Data Quality

IDEM chemists from the Toxicology and Chemistry Section, Assessment Branch, OWQ reviewed laboratory data reports from samples for the *East Branch Stony Run Impaired Water Quality Source Identification Study* for compliance to the Surface Water QAPP requirements for Quality Assurance/Quality Control (QA/QC).

Precision

The in-lab quality assurance for data in this report for analytical precision was based on laboratory duplicates, matrix spike duplicates, and Relative Percent Difference (RPD). The RPDs for all parameters were within control limits (+/-20%) for this study.

Accuracy

The in-lab analytical accuracy was based on matrix spikes, matrix spike duplicates, quality control samples, and on-going performance recovery samples. Laboratory QC samples were within control limits for all parameters.

Holding Times

Laboratory holding times for all the parameters were within acceptable limits per Table 2 in 40 CFR part 136.

Blanks

Significant results, greater than the MRL, for a parameter indicates contamination from the field sampling process (field blanks) or laboratory sample preparation (field blanks or lab blanks). Significant contamination of chemical oxygen demand (COD), total kjeldahl nitrogen (TKN),

and ammonia nitrogen were noted for all data sets. Affected results were flagged as rejected and not used for final conclusions presented in this study.

Of the 140 results gathered for this project, 20.7% (29) were qualified as rejected. None were estimated. As per the Surface Water QAPP, the non-rejected data was qualified at Data Quality Assessment Level 3 and acceptable for use in IDEM decision making processes. Rejected data was not used for assessment purposes. Details of the Quality Assurance Analysis are included in Attachments II and III.

Table 5 General Chemistry Laboratory Results From Composite Samples

| Site | Stream Name | Alkalinity (as CaCO ₃) (mg/L) | CBOD ₅ (mg/L) | COD (mg/L) | Chloride (mg/L) | Hardness (as CaCO ₃) (mg/L) | Total Solids (Mg/L) | TDS (mg/L) | Suspended Solids (mg/L) | Sulfate (mg/L) | TOC (mg/L) |
|-------------|-------------------------|---|-----------------------------|------------------|--------------------|---|---------------------------|---------------|-------------------------------|-------------------|---------------|
| UMK130-0011 | Lake Outlet | 330 | 2.4 | <50 ¹ | 620 ² | 440 | 1700 | 1600 | 27 | 19 | 3 |
| UMK130-0012 | Twin Lake Utilities 001 | 330 | 3 | <55 | 690 | 520 | 2000 | 1800 | 12 | 28 | 3 |
| UMK130-0013 | E Br Stony Run | 170 | 2 | <50 | 630 | 430 | 1700 | 1600 | 22 | 24 | 2.8 |
| UMK130-0014 | E Br Stony Run | 320 | 1.5 | <50 | 450 | 430 | 1400 | 1300 | 26 | 66 | 2.9 |
| UMK130-0020 | Winfield Elementary 001 | 120 | 2.7 | <55 | 96 | 350 | 890 | 710 | 11 | 89 | 4.7 |
| UMK130-0015 | E Br Stony Run | 210 | 1.5 | <50 | 400 | 460 | 1300 | 1300 | 28 | 82 | 2.8 |
| UMK130-0016 | E Br Stony Run | 200 | 1 | <50 | 310 | 420 | 1200 | 1100 | 14 | 71 | 2.6 |
| UMK130-0017 | Middle Br Stony Run | 130 | 2 | <50 | 77 | 470 | 720 | 660 | 8 | 130 | 3.5 |
| UMK130-0018 | Stony Run | 200 | <2 | <50 | 39 | 400 | 600 | 620 | 4 | 150 | 2.4 |
| UMK130-0019 | Stony Run | 200 | <2 | <50 | 160 | 480 | 870 | 850 | 8 | 92 | 2.7 |

¹ Due to blank contamination, values listed for COD that are below the reporting limit represent five times the analyzed values found in the sample blank.

² Shaded values indicate stream standard violations. Values found in the Twin Lakes Utilities effluent are not stream standard violations in the strictest sense but are indicative of headwater stream values due to the lack of upstream dilution flow.

Table 6 Nutrients Laboratory Results From Composite Samples

| Site | Stream Name | TKN ¹ (mg/L) | Ammonia (mg/L) | NO ₂ +NO ₃ -N (mg/L) | Phosphorus Total (mg/L) |
|-------------|-------------------------|----------------------------|-------------------|---|----------------------------|
| UMK130-0011 | Lake Outlet | <7.0 | <1.25 | 10 ² | 1.4 |
| UMK130-0012 | Twin Lake Utilities 001 | <4.2 | <1.05 | 13 | 1.6 |
| UMK130-0013 | E Br Stony Run | <7.0 | <1.25 | 11 | 1.5 |
| UMK130-0014 | E Br Stony Run | <7.0 | <1.25 | 7.1 | 1.3 |
| UMK130-0020 | Winfield Elementary 001 | <.1 | <1.05 | 34 | 2 |
| UMK130-0015 | E Br Stony Run | <7.0 | <1.25 | 6.1 | 1.1 |
| UMK130-0016 | E Br Stony Run | <7.0 | <1.25 | 4.5 | 0.54 |
| UMK130-0017 | Middle Br Stony Run | <7.0 | <1.25 | 0.8 | 0.081 |
| UMK130-0018 | Stony Run | <7.0 | <1.25 | 0.17 | 0.036 |
| UMK130-0019 | Stony Run | <7.0 | <1.25 | 22 | 0.28 |

¹ Due to blank contamination, values listed for TKN and Ammonia that are below the reporting limit represent five times the analyzed values found in the sample blank.

² Shaded values indicate stream standard violations. Values found in the Twin Lakes Utilities effluent are not stream standard violations in the strictest sense but are indicative of headwater stream values due to the lack of upstream dilution flow.

Table 7 Field Sampling Results

| Site | Stream Name | Date | Time | DO mg/L | pH SU | Temp. °C | Spec. Cond. | Turbidity NTU |
|-------------|-------------------------|----------|----------|------------|----------|-------------|----------------|------------------|
| UMK130-0011 | Lake Outlet | 10/11/00 | 8:15 AM | 8.28 | 8.01 | 12.38 | 2840 | 30.5 |
| UMK130-0011 | Lake Outlet | 10/11/00 | 12:35 PM | 7.72 | 8.04 | 13.93 | 2760 | 34.7 |
| UMK130-0012 | Twin Lake Utilities 001 | 10/11/00 | 9:10 AM | 9.35 | 7.44 | 16.23 | 2910 | 9.6 |
| UMK130-0012 | Twin Lake Utilities 001 | 10/11/00 | 4:45 PM | 9.56 | 7.46 | 18.04 | 3160 | 30.8 |
| UMK130-0012 | Twin Lake Utilities 001 | 10/12/00 | 8:15 AM | 9.48 | 7.42 | 16.11 | 3000 | 11.7 |
| UMK130-0013 | E Br Stony Run | 10/11/00 | 9:10 AM | 9.25 | 8.05 | 9.85 | 2840 | 15.8 |
| UMK130-0013 | E Br Stony Run | 10/11/00 | 12:50 PM | 11.11 | 8.24 | 13.72 | 2890 | 13.2 |
| UMK130-0013 | E Br Stony Run | 10/11/00 | 3:35 PM | 10.28 | 8.27 | 14.21 | 2860 | 18.4 |
| UMK130-0013 | E Br Stony Run | 10/12/00 | 5:00 AM | 8.34 | 8.09 | 9.73 | 3050 | 18.5 |
| UMK130-0020 | Winfield Elementary 001 | 10/11/00 | 10:40 AM | 5.9 | 7.3 | 14.14 | 1055 | 8.5 |
| UMK130-0020 | Winfield Elementary 001 | 10/11/00 | 4:20 PM | 7.3 | 7.4 | 14.39 | 1032 | 10.4 |
| UMK130-0020 | Winfield Elementary 001 | 10/12/00 | 9:30 AM | 6.6 | 7.2 | 13.89 | 1025 | 8.1 |
| UMK130-0014 | E Br Stony Run | 10/11/00 | 9:25 AM | 9.2 | 8.06 | 7.86 | 2280 | 26.1 |
| UMK130-0014 | E Br Stony Run | 10/11/00 | 1:09 PM | 10.35 | 8.16 | 10.1 | 2270 | 19.3 |
| UMK130-0014 | E Br Stony Run | 10/11/00 | 3:50 PM | 10.31 | 8.23 | 11.46 | 2270 | 21.6 |
| UMK130-0014 | E Br Stony Run | 10/12/00 | 5:15 AM | 8.61 | 8.07 | 7.73 | 2330 | 28.2 |
| UMK130-0015 | E Br Stony Run | 10/11/00 | 9:45 AM | 11.12 | 8.19 | 7.67 | 2110 | 13.2 |
| UMK130-0015 | E Br Stony Run | 10/11/00 | 1:20 PM | 15.46 | 8.57 | 13.22 | 2100 | 15.5 |
| UMK130-0015 | E Br Stony Run | 10/11/00 | 4:00 PM | 14.26 | 8.68 | 14.1 | 2100 | 22.4 |
| UMK130-0015 | E Br Stony Run | 10/12/00 | 5:25 AM | 8.9 | 8.07 | 6.36 | 2210 | 40.51 |
| UMK130-0016 | E Br Stony Run | 10/11/00 | 10:00 AM | 11.42 | 8.15 | 7.53 | 1830 | 12.1 |
| UMK130-0016 | E Br Stony Run | 10/11/00 | 1:33 PM | 17.57 | 8.54 | 12.25 | 1860 | 10.7 |
| UMK130-0016 | E Br Stony Run | 10/11/00 | 4:10 PM | 15.54 | 8.57 | 13.18 | 1800 | 9.6 |
| UMK130-0016 | E Br Stony Run | 10/12/00 | 5:40 AM | 8.08 | 7.89 | 7.09 | 1830 | 6.9 |
| UMK130-0017 | Middle Br Stony Run | 10/11/00 | 10:15 AM | 9.83 | 7.95 | 6.57 | 1038 | 4.8 |
| UMK130-0017 | Middle Br Stony Run | 10/11/00 | 1:40 PM | 11.01 | 8.06 | 12.56 | 1038 | 4.1 |
| UMK130-0017 | Middle Br Stony Run | 10/11/00 | 4:20 PM | 9 | 8.04 | 14.48 | 1043 | 6.4 |
| UMK130-0017 | Middle Br Stony Run | 10/12/00 | 5:55 AM | 7.64 | 7.91 | 5.65 | 1055 | 11.4 |
| UMK130-0018 | Stony Run | 10/11/00 | 10:30 AM | 11.15 | 8.05 | 9.31 | 882 | 6 |
| UMK130-0018 | Stony Run | 10/11/00 | 1:47 PM | 12.32 | 8.18 | 14.36 | 869 | 6.3 |
| UMK130-0018 | Stony Run | 10/11/00 | 4:25 PM | 10.89 | 8.22 | 13.18 | 863 | 5.3 |
| UMK130-0018 | Stony Run | 10/12/00 | 6:00 AM | 9.03 | 7.97 | 6.03 | 864 | 14.8 |
| UMK130-0019 | Stony Run | 10/11/00 | 10:50 AM | 12.66 | 8.13 | 8.68 | 1350 | 5.8 |
| UMK130-0019 | Stony Run | 10/11/00 | 2:03 PM | 15.93 | 8.33 | 12.75 | 1350 | 5.9 |
| UMK130-0019 | Stony Run | 10/11/00 | 4:40 PM | 15.21 | 8.41 | 13.82 | 1357 | 9.4 |
| UMK130-0019 | Stony Run | 10/12/00 | 6:15 AM | 9.09 | 8.01 | 6.9 | 1355 | 5.2 |

Summary and Conclusions

Findings from this study have indicated that stream degradation in East Branch Stony Run is primarily due to point source impact from the Twin Lakes Utilities STP and to a lesser degree from the Winfield Elementary STP. The Twin Lakes Utilities effluent discharge makes up 100% of stream flow in the headwater reaches when no water is being released from the Lake Holiday dam outlet. Without any stream dilution, especially during warm weather summer months, there is little margin for error in plant operations in protecting downstream aquatic life. Data gleaned from facility MROs and DMRs showed that operational problems in the summers of 1999 and 2000 in fact did cause water chemistry stream standard violations and adverse impacts to aquatic life. Permit violations for ammonia from Twin Lakes Utilities STP was the most serious and most consistently observed cause of impacts found from this study. Other parameters causing stream standard violations included chlorides, total dissolved solids, and nitrate+nitrite.

The impairment of East Branch Stony Run was most evident by poor biological findings at the probabilistic site in 1999 and visible lack of aquatic life at any of the sampling locations along the study reach downstream of the facility outfalls in 2000. The proliferation of algae at sites UMK130-0015 and UMK130-0016 was another manifestation of the point sources impact. The lack of aquatic life coupled with abundant algae growth in East Branch Stony Run was in graphic contrast to Stony Run which was very clear, relatively devoid of algae, and had numerous schools of minnows. Although Stony Run had similar habitat concerns as the lower reaches of East Branch Stony Run such as channelization, row crop activity, and dredging, these habitat concerns did not appear to be stifling all visible evidence of aquatic life nor promoting excessive algae growth. The conclusion here is that point source activity was the overriding factor in the aquatic life use impairment of East Branch Stony Run.

For 305(b) assessment and reporting purposes, causes and sources were determined and are listed in Tables 8 and 9 (IDEM 2002a). It should be noted that all observed sources are listed below, even though the point source dischargers were shown to be the prevailing sources of aquatic life use impairment.

Table 8 Identified Causes for 305(b) Report and 303(d) Impairment Listings

| Cause Code | Cause Name | Definition |
|-------------------|----------------------------|--|
| 600 | Unionized Ammonia | Exceeds 1999 EPA ammonia criteria |
| 930 | Nitrate | Not used |
| 1320 | TDS | Total dissolved solids |
| 1330 | Chlorides | Chloride anion concentration exceeds criterion |
| 1600 | Other habitat alterations | Response to land use practice such as dredging or channelization |
| 2210 | Algal Growth/Chlorophyll a | Overgrowth of algae observed |

Table 9 Identified Sources for 305(b) Report and 303(d) Impairment Listing

| Source Code | Source Name | Definition |
|--------------------|--|---|
| 220 | Minor Municipal Point Source (Actually Major Semi-Public) | Not used |
| 230 | Package Plants (Small Flows) | NPDES Semi-public facility |
| 1050 | Crop-related Sources | Land use is row crops |
| 7100 | Channelization | Straightening channel; destroying instream habitat |
| 7200 | Dredging | Removing instream sediment/habitat |
| 7600 | Removal of Riparian Vegetation | Bushes, trees removed; row crops to bank edge; bare soil |

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Attachment I

Indiana Department of Environmental Management Office of Water Quality/ Assessment Branch/ Biological Studies Section Fish Community Assessments

Site Information

SubBasin: Kankakee 14 digit HUC: 07120001130010 LSite: UMK130-0003
Site: E Br Stony Run Location: 157th Ave County: Lake
Latitude: 41 20 10.997 Longitude: -87 15 28.2 IASNatRegion: 2A Topo: B-03 Segment: 14
Ecoregion: Central Corn Belt Plains DrainageArea (sq.miles): 15.7 Gradient (ft/mile): 7.8

Sample Information

SampleNumber: DA13586 EventID: 99071 SampleMediumCollected: Water + FishComm + FishTiss
SampleDate: 7/13/99 1:00: SurveyCrewChief: ARB SampleTime: 1:00:00 PM HydroLabNumber: BS3
WaterFlowType: WaterAppearance: SkyConditions: Partly AirTemperature: 76-85
WindDirection: West (270 degrees) WindStrength: Light
DissolvedO2 (mg/l): 17 pH: 8.4 WaterTemp (°C): 22.2 SpecificConductivity (µS/cm): 1560 Turbidity (NTU): 0
SpecialNotes:

ElectrofishingEquipment: Backpack Voltage: 100 Avg.StreamWidth (m): 5.1 DistanceFished (m): 75
SecondsFished: 809 WaterDepthAvg (m): 0.2 WaterDepthMax (m): 0.5 TimeAtSite: 1:30
BridgeInReach: ☐ ReachRepresentative: ☒ WhyReachNotRepresentative:
SpecialComments:

Habitat Information

TotalScore (max100): 49 SubstrateScore (max20): 13 InstreamCoverScore (max20): 6 ChannelMorphologyScore (max20): 9
RiparianZoneBankErosionScore (max10): 3 Pool/GlideQualityScore (max12): 4 Riffle/RunScoreQuality (max8): 4
GradientScore(max10): 1 %Pool: 5 %Riffle: 5 %Run: 90 %Glide: 0 CanopyCoverPctOpen: 100
SubjectiveRating: 7 AestheticRating: 3 NOTES:

Fish Community Index of Biotic Integrity (IBI) Information

| | Actual Observation | Metric Score | | Actual Observation | Metric Score |
|---|--------------------|--------------|-----------------------------------|--------------------|--------------|
| SpeciesCount: | 9 | 3 | SensitiveSpeciesCount: | 3 | 3 |
| Darter/Madtom/SculpinSpeciesCount: | 0 | 1 | %TolerantIndividuals: | 18.6 | 5 |
| DarterSpeciesCount: | 0 | | %OmnivoreIndividuals: | 2.9 | 5 |
| %LargeRiverIndividuals: | | | %InsectivoreIndividuals: | 11.4 | 1 |
| %HeadwaterIndividuals: | 1.4 | 1 | %PioneerIndividuals: | 88.6 | 1 |
| SunfishSpeciesCount: | 1 | | %CarnivoreIndividuals: | 0.0 | |
| CentrarchidaeSpeciesCount: | | | Total #of Individuals(CPUE): | 70 | 1 |
| MinnowSpeciesCount: | 8 | 5 | CPUElessGizzardShads: | | |
| SuckerSpeciesCount: | 0 | | %SimpleLithophilicInd.: | 2.9 | 1 |
| RoundBodySuckerSpeciesCount: | | | %Ind.withDeformities, | 0.0 | 5 |
| SalmonidaeSpeciesCount: | | | ErodedFins,Lesions,Tumors: | | |
| Metrics are dependent on Ecoregion and Drainage Area. Metrics can score a 1, 3, or 5 depending on calibration. | | | TotalIBIScore (min 6=no fish): | 32 | max=60 |

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

SampleNumber: DA13586 **EventID:** 99071 **LSite:** UMK130-0003 **County:** Lake
StreamName: E Br Stony Run **LocationDescription:** 157th Ave

| Common Name | Individual Fish Count | Deformities | Eroded Fins | Lesions | Tumors | Multiple Anomalies |
|------------------------|-----------------------|-------------|-------------|---------|--------|--------------------|
| Blackchin Shiner | 1 | 0 | 0 | 0 | 0 | 0 |
| Blacknose Dace | 1 | 0 | 0 | 0 | 0 | 0 |
| Creek Chub | 9 | 0 | 0 | 0 | 0 | 0 |
| Fathead Minnow | 2 | 0 | 0 | 0 | 0 | 0 |
| Green Sunfish | 1 | 0 | 0 | 0 | 0 | 0 |
| Honeyhead Chub | 4 | 0 | 0 | 0 | 0 | 0 |
| Largescale Stoneroller | 50 | 0 | 0 | 0 | 0 | 0 |
| Sand Shiner | 1 | 0 | 0 | 0 | 0 | 0 |
| Striped Shiner | 1 | 0 | 0 | 0 | 0 | 0 |

Attachment II

Quality Assurance of Analytical Data for Water Samples from the Source Identification Sampling Dates: 10/11 TO 10/12/2000

Environmental Toxicology and Chemistry Section, AB/OWM
QA/QC Review Report: IDEM/100/29/477/008/2001

IDEM Sample Set # 00WQW231

Sample Identification and Sampling Locations

| | SampleID | TA Sample No. | Sample Type | Date Sampled | Site Name | River/Stream/Creek/Lake | Sample Location | County |
|----|----------|---------------|-------------|--------------|-------------|--------------------------|------------------------|--------|
| 1 | AA02464 | 278039 | Normal | 10/11/00 | UMK130-0011 | Lake of the Four Seasons | Lake Outlet | Lake |
| 2 | AA02465 | 278040 | Field Blank | 10/11/00 | BLANK | | Dummy Site for Blanks | |
| 3 | AA02467 | 278041 | Normal | 10/12/00 | UMK130-0013 | East Branch Stony Run | 129th Ave. East Branch | Lake |
| 4 | AA02469 | 278042 | Normal | 10/12/00 | UMK130-0014 | East Branch Stony Run | Montgomery Rd. | Lake |
| 5 | AA02470 | 278043 | Normal | 10/12/00 | UMK130-0015 | East Branch Stony Run | 145th. Ave. | Lake |
| 6 | AA02471 | 278044 | Normal | 10/12/00 | UMK130-0016 | East Branch Stony Run | 157th Ave. | Lake |
| 7 | AA02472 | 278045 | Normal | 10/12/00 | UMK130-0017 | Middle Branch Stony Run | 157th Ave. | Lake |
| 8 | AA02473 | 278046 | Normal | 10/12/00 | UMK130-0018 | Stony Run | 157th Ave. | Lake |
| 9 | AA02474 | 278047 | MS/MSD | 10/12/00 | UMK130-0019 | Stony Run | 165th Ave. | Lake |
| 10 | AA02479 | 278048 | Duplicate | 10/12/00 | UMK130-0016 | East Branch Stony Run | 157th Ave. | Lake |

Testing Laboratory:

Test America Incorporated (TA)
Indianapolis Division
6964 Hillsdale Ct.
Indianapolis, IN 46250

Contact Person:

Ž Ken Busch

Ž Telephone: 317-842-4261

Sample Receipt Date to TA: 10/12/2000 Date Report Prepared: 12/15/2000

TA Job Number (s): 00.05542 Date Report Received: 1/3/2001

Chain of Custody: A check mark (U) below indicates information about each item is complete and acceptable.

| | | |
|------------------------|-------------------------|----------------------|
| Ž Sampler Signature U | Ž Custodian Signature U | Ž Collection Time(s) |
| Ž Collection Date(s) U | Ž Receiving Time(s) U | Ž Receiving Date(s) |
| Ž Preservatives U | Ž Containers U | |

General Chemistries

Test Methods and Reporting Limits (mg/L unless otherwise noted)

| <u>PARAMETERS:</u> | <u>TEST METHODS</u> | <u>IDEM REPORTING LIMITS</u> | <u>TA REPORTING LIMITS</u> |
|---|---------------------|--------------------------------------|------------------------------------|
| Alkalinity | 310.1 | 10 | 10 |
| Chloride | 325.2 | 1.0 | 1.0 |
| Carbonaceous Biochemical Oxygen Demand(CBOD ₅) | 405.1 | 2.0 | 1.0 |
| Chemical Oxygen Demand (COD) | 410.4 | 3.0 | 5.0 |
| Hardness (as CaCO ₃) | 130.1 | 1.0 | 1.0 |
| Nitrogen, Ammonia | 350.1 | 0.01 | 0.10 |
| Nitrogen, Total Kjeldahl (TKN) | 351.2 | 0.05 | 0.10 |
| Nitrogen, Nitrate+Nitrite | 353.2 | 0.01 | 0.01 |
| Phosphorus, Total | 365.2 | 0.01 | 0.03 |
| Solids, Dissolved (TDS) | 160.1 | 10 | 10 |
| Solids, Suspended (TSS) | 160.2 | 4.0 | 4.0 |
| Solids, Total (TS) | 160.3 | 1.0 | 7.0 |
| Sulfate | 375.2 | 1.0 | 5.0 |
| Total Organic Carbon (TOC) | 415.1 | 1.0 | 1.0 |

Quality Control (QC) Checks and Compliance: A check mark (U) below indicates information about each QC criterion is complete and acceptable.

- ☑ Summary Data Package U
- ☑ Prep Dates U
- ☑ Analysis Dates U
- ☑ Holding Times U
- ☑ Approved Analytical Methods U
- ☑ Approved Detection Limits U
- ☑ Method, Field, and Trip Blanks (< CRQL) U
- ☑ Field and Method Duplicates (RPD ≤ 20%) U
- ☑ Matrix Spikes and Matrix Spike Duplicates (± 20%; RPD ≤ 20%) U
- ☑ Instrument Calibrations (Correlation Coefficient ≥ 0.995) U
- ☑ Laboratory Control Standards (± 20%) U
- ☑ Initial and Continuing Calibration Verification Standards (± 10%) U

Comments: See Below

| <u>IDEM ID</u> | <u>Parameter(s)</u> | <u>Data Flag(s)</u> | <u>Action</u> |
|--|----------------------------------|----------------------------|----------------------|
| AA02464, AA02465, AA02467, AA02469, AA02470, AA02471, AA02472, AA02473, AA02474, AA02479 | Chemical Oxygen Demand (COD) ① | B R | Rejected |
| AA02464, AA02465, AA02467, AA02469, AA02470, AA02471, AA02472, AA02473, AA02474, AA02479 | Nitrogen, Total Kjeldahl (TKN) ② | B R | Rejected |
| AA02464, AA02465, AA02467, AA02469, AA02470, AA02471, AA02472, AA02473, AA02474, AA02479 | Nitrogen, Ammonia ③ | B R | Rejected |

- ① This parameter was found in field blank at 10 mg/L. All of the samples that are above the reporting limit and below 50 mg/L will be rejected.
- ② This parameter was found in field blank at 1.4 mg/L. All of the samples that are above the reporting limit and below 7.0 mg/L will be rejected.
- ③ This parameter was found in field blank at .25mg/L. All of the samples that are above the reporting limit and below 1.25 mg/L will be rejected.

Data Qualifiers and Flags

R: Rejected

J: Estimated.

Q: One or more of the QC checks or criteria was out of control.

H: The analysis for this parameter was performed out of the holding time. The results will be estimated or rejected on the basis listed below:

- 1) If the analysis was performed between the holding time and 1½ times the holding time the result will be estimated.
- 2) If the analysis was performed outside the 1½ times the holding time window the result will be rejected.

D: The Relative Present Difference (RPD) for this parameter was above the acceptable control limits. The parameter will be considered estimated or rejected on the basis listed below:

- 1) If the RPD is between the established control limits and two times the established control limits then the sample will be estimated.
- 2) If the RPD is twice the established control limits then the sample will be rejected.

B: This parameter was found in field or lab blank. Whether the result is accepted, estimated, or rejected will be based upon the level of contamination listed below.

- 1) If the result of the sample is greater than the reporting limit but less than five times the blank contamination the result will be rejected.
- 2) If the result of the sample is between five and ten times the blank contamination the result will be estimated
- 3) If the result of the sample is less than the reporting limit or greater than ten times the blank contamination the result will be accepted.

U: The result of the parameter is above the Method Detection Limit (MDL) but below the reporting limit and will be estimated.

Data Quality Assessments (DQAs): A check mark (U) below indicates the DQA Level to which the analytical data qualifies.

- Level 1 9** **Screening data:** The results are usually generated onsite and have no QC checks. Analytical results, which have no QC checks or no precision or accuracy information or no detection limit calculations, but just numbers, are included in this category. Primarily, onsite data are used for presurveys and for preliminary rapid assessment.
- Level 2 9** **Field analysis data:** Data is recorded in the field or laboratory on calibrated or standardized equipment. Field duplicates are measured on a regular periodic basis. Calculations may be done in the field or later at the office. Analytical results, which have limited QC checks, are included in this category. Detection limits and ranges have been set for each analysis. The QC checks information for field or laboratory results is useable for estimating precision, accuracy, and completeness for the project. Data from this category is used independently for rapid assessment and preliminary decisions.
- Level 3 [U]** **Laboratory analytical data:** Analytical results include QC check samples for each batch of samples from which precision, accuracy, and completeness can be determined. Detection limits have been determined using 40 CFR Part 136 Appendix B, Revision 1.11. Raw data, chromatograms, spectrograms, and bench sheets are not included as part of the analytical report, but are maintained by the Contract Laboratory for easy retrieval and review. Data can be elevated from level 3 to level 4 by the inclusion of this information in the report. In addition, level 4 QC data must be reported using CLP forms or CLP format. Data falling under this category is considered as complete and is used for regulatory decisions.
- Level 4 9** **Enforcement data:** Analytical results mostly meet the USEPA required Contract Laboratory Program (CLP) data analysis, contract required quantification limits (CRQL), and validation procedures. QC data is reported on CLP forms or CLP format. Raw data, chromatograms, spectrograms, and bench sheets are included as part of the analytical report. Additionally, all reporting information required in the IDEM/BAA and in the Surface Water QAPP Table 11-1 are included. Data is legally quantitative in value, and is used for regulatory decisions.

Compliance Statement:

The laboratory results for a Data package from **10 water** samples received from Test America (TA) were reviewed for compliance with IDEM BAA 97-44, dated 4/18/97 and OWM QAPP (Rev. 2, June 1999) for Indiana Surface Water Programs.

Summary and Conclusions:

1. Data Quality Assessment Level: 3
2. Level of Completeness: 100%

The data for the **10 water** samples from data package **00WQW231** has been assigned to Data Quality Assessment (DQA) Level 3 of QAPP for Indiana Surface Water Programs. The analytical results for **10 water** samples appear acceptable and could be used for OWM decision making.

Reviewed by:

Signature: Christopher Haynes Title: Chemist Date: January 3, 2001

Signed Copy on File

Approved by:

Signature: Dr. Syed GhiasUddin Title: QA/Coordinator Date:

Signed Copy on File

Distribution List: Art Garceau
Larry McFall
Carl Christensen
Christopher Haynes
Dr. GhiasUddin
(File copy)

Attachment III

Quality Assurance of Analytical Data for Water Samples from the Source Identification Sampling Dates: 10/11 TO 10/12/2000

Environmental Toxicology and Chemistry Section, AB/OWM
QA/QC Review Report: IDEM/100/29/477/012/2001

IDEM Sample Set # 00WQW232

Sample Identification and Sampling Locations

| | SampleID | TA Sample No. | Sample Type | Date Sampled | Site Name | River/Stream/Creek/Lake | Sample Location | County |
|---|----------|---------------|-------------|--------------|-------------|-------------------------|-----------------------|--------|
| 1 | AA02475 | 278049 | Field Blank | 10/11/00 | BLANK | | Dummy Site for Blanks | |
| 2 | AA02466 | 278050 | Normal | 10/12/00 | UMK130-0012 | Twin Lake Utilities | STP 001 | Lake |
| 3 | AA02468 | 278051 | Normal | 10/12/00 | UMK130-0020 | Winfield Elementary | STP 001 | Lake |

Testing Laboratory:

Test America Incorporated (TA)
Indianapolis Division
6964 Hillsdale Ct.
Indianapolis, IN 46250

Contact Person:

Ž Ken Busch

Ž Telephone: 317-842-4261

Sample Receipt Date to TA: 10/12/2000 Date Report Prepared: 12/5/2000
TA Job Number (s): 00.05543 Date Report Received: 1/4/2001

Chain of Custody: A check mark (U) below indicates information about each item is complete and acceptable.

| | | | |
|---|------------------------|-------------------------|----------------------|
| U | Ž Sampler Signature U | Ž Custodian Signature U | Ž Collection Time(s) |
| U | Ž Collection Date(s) U | Ž Receiving Time(s) U | Ž Receiving Date(s) |
| U | Ž Preservatives U | Ž Containers U | |

General Chemistries

Test Methods and Reporting Limits (mg/L unless otherwise noted)

| <u>PARAMETERS:</u> | <u>TEST METHODS</u> | <u>IDEM REPORTING LIMITS</u> | <u>TA REPORTING LIMITS</u> |
|---|---------------------|--------------------------------------|------------------------------------|
| Alkalinity | 310.1 | 10 | 10 |
| Chloride | 325.2 | 1.0 | 1.0 |
| Carbonaceous Biochemical Oxygen Demand(CBOD ₅) | 405.1 | 2.0 | 1.0 |
| Chemical Oxygen Demand (COD) | 410.4 | 3.0 | 5.0 |
| Hardness (as CaCO ₃) | 130.1 | 1.0 | 1.0 |
| Nitrogen, Ammonia | 350.1 | 0.01 | 0.10 |
| Nitrogen, Total Kjeldahl (TKN) | 351.2 | 0.05 | 0.10 |
| Nitrogen, Nitrate+Nitrite | 353.2 | 0.01 | 0.01 |
| Phosphorus, Total | 365.2 | 0.01 | 0.03 |
| Solids, Dissolved (TDS) | 160.1 | 10 | 10 |
| Solids, Suspended (TSS) | 160.2 | 4.0 | 4.0 |
| Solids, Total (TS) | 160.3 | 1.0 | 7.0 |
| Sulfate | 375.2 | 1.0 | 5.0 |
| Total Organic Carbon (TOC) | 415.1 | 1.0 | 1.0 |

Quality Control (QC) Checks and Compliance: A check mark (U) below indicates information about each QC criterion is complete and acceptable.

- ☑ Summary Data Package U
- ☑ Prep Dates U
- ☑ Analysis Dates U
- ☑ Holding Times U
- ☑ Approved Analytical Methods U
- ☑ Approved Detection Limits U
- ☑ Method, Field, and Trip Blanks (< CRQL) U
- ☑ Field and Method Duplicates (RPD ≤ 20%) U
- ☑ Matrix Spikes and Matrix Spike Duplicates (± 20%; RPD ≤ 20%) U
- ☑ Instrument Calibrations (Correlation Coefficient ≥ 0.995) U
- ☑ Laboratory Control Standards (± 20%) U
- ☑ Initial and Continuing Calibration Verification Standards (± 10%) U

Comments: See Below

| <u>IDEM ID</u> | <u>Parameter(s)</u> | <u>Data Flag(s)</u> | <u>Action</u> |
|-----------------------|----------------------------------|----------------------------|----------------------|
| AA02466, AA02468 | Chemical Oxygen Demand (COD) ① | B R | Rejected |
| AA02466 | Nitrogen, Total Kjeldahl (TKN) ② | B R | Rejected |
| AA02468 | Nitrogen, Total Kjeldahl (TKN) ③ | B A | Accepted |
| AA02466, AA02468 | Nitrogen, Nitrate+Nitrite ④ | B A | Accepted |
| AA02466, AA02468 | Nitrogen, Ammonia ⑤ | B R | Rejected |

- ① This parameter was found in field blank at 11 mg/L. All of the samples that are above the reporting limit and below 55 mg/L will be rejected.
- ② This parameter was found in field blank at .84 mg/L. All of the samples that are above the reporting limit and below 4.2 mg/L will be rejected.
- ③ This parameter was found in field blank at .84 mg/L. All of the samples that are below the reporting limit or above 8.4 mg/L will be accepted.
- ④ This parameter was found in field blank at .013 mg/L. All of the samples that are below the reporting limit or above .13 mg/L will be accepted.
- ⑤ This parameter was found in field blank at .21 mg/L. All of the samples that are above the reporting limit and below 1.05 mg/L will be rejected.

Data Qualifiers and Flags

R: Rejected

J: Estimated.

Q: One or more of the QC checks or criteria was out of control.

H: The analysis for this parameter was performed out of the holding time. The results will be estimated or rejected on the basis listed below:

- 1) If the analysis was performed between the holding time and 1½ times the holding time the result will be estimated.
- 2) If the analysis was performed outside the 1½ times the holding time window the result will be rejected.

D: The Relative Present Difference (RPD) for this parameter was above the acceptable control limits. The parameter will be considered estimated or rejected on the basis listed below:

- 1) If the RPD is between the established control limits and two times the established control limits then the sample will be estimated.
- 2) If the RPD is twice the established control limits then the sample will be rejected.

B: This parameter was found in field or lab blank. Whether the result is accepted, estimated, or rejected will be based upon the level of contamination listed below.

- 1) If the result of the sample is greater than the reporting limit but less than five times the blank contamination the result will be rejected.
- 2) If the result of the sample is between five and ten times the blank contamination the result will be estimated
- 3) If the result of the sample is less than the reporting limit or greater than ten times the blank contamination the result will be accepted.

U: The result of the parameter is above the Method Detection Limit (MDL) but below the reporting limit and will be estimated.

Data Quality Assessments (DQAs): A check mark (U) below indicates the DQA Level to which the analytical data qualifies.

- Level 1 9** **Screening data:** The results are usually generated onsite and have no QC checks. Analytical results, which have no QC checks or no precision or accuracy information or no detection limit calculations, but just numbers, are included in this category. Primarily, onsite data are used for presurveys and for preliminary rapid assessment.
- Level 2 9** **Field analysis data:** Data is recorded in the field or laboratory on calibrated or standardized equipment. Field duplicates are measured on a regular periodic basis. Calculations may be done in the field or later at the office. Analytical results, which have limited QC checks, are included in this category. Detection limits and ranges have been set for each analysis. The QC checks information for field or laboratory results is useable for estimating precision, accuracy, and completeness for the project. Data from this category is used independently for rapid assessment and preliminary decisions.
- Level 3 [U]** **Laboratory analytical data:** Analytical results include QC check samples for each batch of samples from which precision, accuracy, and completeness can be determined. Detection limits have been determined using 40 CFR Part 136 Appendix B, Revision 1.11. Raw data, chromatograms, spectrograms, and bench sheets are not included as part of the analytical report, but are maintained by the Contract Laboratory for easy retrieval and review. Data can be elevated from level 3 to level 4 by the inclusion of this information in the report. In addition, level 4 QC data must be reported using CLP forms or CLP format. Data falling under this category is considered as complete and is used for regulatory decisions.
- Level 4 9** **Enforcement data:** Analytical results mostly meet the USEPA required Contract Laboratory Program (CLP) data analysis, contract required quantification limits (CRQL), and validation procedures. QC data is reported on CLP forms or CLP format. Raw data, chromatograms, spectrograms, and bench sheets are included as part of the analytical report. Additionally, all reporting information required in the IDEM/BAA and in the Surface Water QAPP Table 11-1 are included. Data is legally quantitative in value, and is used for regulatory decisions.

Compliance Statement:

The laboratory results for a Data package from **3 water** samples received from Test America (TA) were reviewed for compliance with IDEM BAA 97-44, dated 4/18/97 and OWM QAPP (Rev. 2, June 1999) for Indiana Surface Water Programs.

Summary and Conclusions:

1. Data Quality Assessment Level: 3
2. Level of Completeness: 100%

The data for the **3 water** samples from data package **00WQW232** has been assigned to Data Quality Assessment (DQA) Level 3 of QAPP for Indiana Surface Water Programs. The analytical results for **3 water** samples appear acceptable and could be used for OWM decision making.

Reviewed by:

Signature: Christopher Haynes Title: Chemist Date: January 3, 2001

Signed Copy on File

Approved by:

Signature: Dr. Syed GhiasUddin Title: QA/Coordinator Date: _____

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